THE MALAY ARCHIPELAGO

This Edition is intended for circulation only in India and the British Colonies.

Macmillan's Colonial Library

THE

MALAY ARCHIPELAGO

THE LAND OF THE

ORANG-UTAN AND THE BIRD OF PARADISE

A NARRATIVE OF TRAVEL

WITH STUDIES OF MAN AND NATURE

ALFRED RUSSEL WALLACE

AUTHOR OF "DARWINISM," "ISLAND LIFE," ETC.

London

MACMILLAN AND CO.

AND NEW YORK

1893

No. 117

The Right of Translation and Reproduction is Reserved

1982

31 ஜூலை 1982

RICHARD CLAY AND SONS, LIMITED,
LONDON AND BUNGAY.

First Edition (2 vols. ...) February 1869.
Reprinted October 1869.
New Edition (1 vol. crown 8vo) February 1872.
Reprinted October 1872, 1874, 1877, 1879, 1883, 1886.
New Edition (1 vol. extra crown 8vo) 1890, 1893.

7771

TO

CHARLES DARWIN

AUTHOR OF "THE ORIGIN OF SPECIES"

I Dedicate this Book

NOT ONLY

AS A TOKEN OF PERSONAL ESTEEM AND FRIENDSHIP

BUT ALSO

TO EXPRESS MY DEEP ADMIRATION

For his Genius and his Works

PREFACE TO THE TENTH EDITION

SINCE this work was first published, twenty-one years ago, several naturalists have visited the Archipelago; and in order to give my readers the latest results of their researches I have added footnotes whenever my facts or conclusions have been modified by later discoveries. I have also made a few verbal alterations in the text to correct any small errors or obscurities. These corrections and additions are however not numerous, and the work remains substantially the same as in the early editions. I may add that my complete collections of birds and butterflies are now in the British Museum.

PARKSTONE, DORSET,
October, 1890.

PREFACE TO THE FIRST EDITION

MY readers will naturally ask why I have delayed writing this book for six years after my return; and I feel bound to give them full satisfaction on this point.

When I reached England in the spring of 1862, I found myself surrounded by a room full of packing-cases, containing the collections that I had from time to time sent home for my private use. These comprised nearly three thousand bird-skins, of about a thousand species; and at least twenty thousand beetles and butterflies, of about seven thousand species; besides some quadrupeds and land-shells. A large proportion of these I had not seen for years; and in my then weak state of health, the unpacking, sorting, and arranging of such a mass of specimens occupied a long time.

I very soon decided, that until I had done something towards naming and describing the most important groups in my collection, and had worked out some of the more interesting problems of variation and geographical distribution, of which I had had glimpses while collecting them, I would not attempt to publish my travels. I could, indeed, at once have printed my notes and journals, leaving all reference to questions of natural history for a future work; but I felt that this would be as unsatisfactory to myself as it would be disappointing to my friends, and uninstructive to the public.

Since my return, up to 1868, I have published eighteen papers, in the *Transactions* or *Proceedings* of the Linnæan Zoological and Entomological Societies, describing or cataloguing portions of my collections; besides twelve others

in various scientific periodicals, on more general su[illegible] connected with them.

Nearly two thousand of my Coleoptera, and many hundred of my butterflies, have been already described by various eminent naturalists, British and foreign; but a much larger number remains undescribed. Among those to whom science is most indebted for this laborious work, I must name Mr. F. P. Pascoe, late President of the Entomological Society of London, who has almost completed the classification and description of my large collection of Longicorn beetles (now in his possession), comprising more than a thousand species, of which at least nine hundred were previously undescribed, and new to European cabinets.

The remaining orders of insects, comprising probably more than two thousand species, are in the collection of Mr. William Wilson Saunders, who has caused the larger portion of them to be described by good entomologists. The Hymenoptera alone amounted to more than nine hundred species, among which were two hundred and eighty different kinds of ants, of which two hundred were new.

The six years' delay in publishing my travels thus enables me to give what I hope may be an interesting and instructive sketch of the main results yet arrived at by the study of my collections; and as the countries I have to describe are not much visited or written about, and their social and physical conditions are not liable to rapid change, I believe and hope that my readers will gain much more than they will lose, by not having read my book six years ago, and by this time perhaps forgotten all about it.

I must now say a few words on the plan of my work.

My journeys to the various islands were regulated by the seasons and the means of conveyance. I visited some islands two or three times at distant intervals, and in some cases had to make the same voyage four times over. A chronological arrangement would have puzzled my readers. They would never

known where they were; and my frequent references to groups of islands, classed in accordance with the peculiarities of their animal productions and of their human inhabitants, would have been hardly intelligible. I have adopted, therefore, a geographical, zoological, and ethnological arrangement, passing from island to island in what seems the most natural succession, while I transgress the order in which I myself visited them as little as possible.

I divide the Archipelago into five groups of islands, as follow:—

I. The Indo-Malay Islands: comprising the Malay Peninsula and Singapore, Borneo, Java, and Sumatra.

II. The Timor Group: comprising the islands of Timor, Flores, Sumbawa, and Lombock, with several smaller ones.

III. Celebes: comprising also the Sula Islands and Bouton.

IV. The Moluccan Group: comprising Bouru, Ceram, Batchian, Gilolo, and Morty; with the smaller islands of Ternate, Tidore, Makian, Kaióa, Amboyna, Banda, Goram, and Matabello.

V. The Papuan Group: comprising the great island of New Guinea, with the Aru Islands, Mysol, Salwatty, Waigiou, and several others. The Ké Islands are described with this group on account of their ethnology, though zoologically and geographically they belong to the Moluccas.

The chapters relating to the separate islands of each of these groups are followed by one on the Natural History of that group; and the work may thus be divided into five parts, each treating of one of the natural divisions of the Archipelago.

The first chapter is an introductory one, on the Physical Geography of the whole region; and the last is a general sketch of the Races of Man in the Archipelago and the surrounding countries. With this explanation, and a reference to the Maps which illustrate the work, I trust that my readers

will always know where they are, and in what dire[ction] they are going.

I am well aware that my book is far too small for the exte[nt] of the subjects it touches upon. It is a mere sketch; but so far as it goes I have endeavoured to make it an accurate one. Almost the whole of the narrative and descriptive portions were written on the spot, and have had little more than verbal alterations. The chapters on Natural History, as well as man[y] passages in other parts of the work, have been written in the hope of exciting an interest in the various questions connected with the origin of species and their geographical distribution. In some cases I have been able to explain my views in detail; while in others, owing to the greater complexity of the subject, I have thought it better to confine myself to a statement of the more interesting facts of the problem, whose solution is to be found in the principles developed by Mr. Darwin in his various works. The numerous illustrations will, it is believed, add much to the interest and value of the book. They have been made from my own sketches, from photographs, or from specimens; and such subjects only have been chosen as would really illustrate the narrative or the descriptions.

I have to thank Messrs. Walter and Henry Woodbury, whose acquaintance I had the pleasure of making in Java, for a number of photographs of scenery and of natives, which have been of the greatest assistance to me. Mr. William Wilson Saunders has kindly allowed me to figure the curious horned flies; and to Mr. Pascoe I am indebted for a loan of two of the very rare Longicorns which appear in the plate of Bornean beetles. All the other specimens figured are in my own collection.

As the main object of all my journeys was to obtain specimens of natural history, both for my private collection and to supply duplicates to museums and amateurs, I will give a general statement of the number of specimens I collected, and which reached home in good condition. I must premise that I

rally employed one or two, and sometimes three Malay vants to assist me; and for three years had the services of a oung Englishman, Mr. Charles Allen. I was just eight years away from England, but as I travelled about fourteen thousand miles within the Archipelago, and made sixty or seventy separate journeys, each involving some preparation and loss of time, I do not think that more than six years were really occupied in collecting.

I find that my Eastern collections amounted to:

310	specimens of	Mammalia.
100	—	Reptiles.
8,050	—	Birds.
7,500	—	Shells.
13,100	—	Lepidoptera.
83,200	—	Coleoptera.
13,400	—	other Insects.
125,660	specimens of	natural history.

It now only remains for me to thank all those friends to whom I am indebted for assistance or information. My thanks are more especially due to the Council of the Royal Geographical Society, through whose valuable recommendations I obtained important aid from our own Government and from that of Holland; and to Mr. William Wilson Saunders, whose kind and liberal encouragement in the early portion of my journey was of great service to me. I am also greatly indebted to Mr. Samuel Stevens (who acted as my agent), both for the care he took of my collections, and for the untiring assiduity with which he kept me supplied, both with useful information, and with whatever necessaries I required.

I trust that these, and all other friends who have been in any way interested in my travels and collections, may derive from the perusal of my book some faint reflexion of the pleasures I myself enjoyed amid the scenes and objects it describes.

CONTENTS

CHAP.		PAGE
I.	Physical Geography	1

INDO-MALAY ISLANDS

II.	Singapore	10
III.	Malacca and Mount Ophir	19
IV.	Borneo—The Orang-Utan	26
V.	Borneo—Journey in the Interior	49
VI.	Borneo—The Dyaks	67
VII.	Java	72
VIII.	Sumatra	93
IX.	Natural History of the Indo-Malay Islands	106

THE TIMOR GROUP

X.	Bali and Lombock	115
XI.	Lombock—Manners and Customs	125
XII.	Lombock—How the Rajah took the Census	136
XIII.	Timor	141
XIV.	Natural History of the Timor Group	155

THE CELEBES GROUP

XV.	Celebes—Macassar	162
XVI.	Celebes—Macassar	175
XVII.	Celebes—Menado	185
XVIII.	Natural History of Celebes	207

CONTENTS

THE MOLUCCAS

CHAP.		PAGE
XIX.	Banda	219
XX.	Amboyna	223
XXI.	Ternate	234
XXII.	Gilolo	240
XXIII.	Voyage to the Kaióa Islands and Batchian	244
XXIV.	Batchian	250
XXV.	Ceram, Goram, and the Matabello Islands	267
XXVI.	Bouru	293
XXVII.	The Natural History of the Moluccas	299

THE PAPUAN GROUP

XXVIII.	Macassar to the Aru Islands in a Native Prau	308
XXIX.	The Ké Islands	317
XXX.	The Aru Islands—Residence in Dobbo	327
XXXI.	The Aru Islands—Journey and Residence in the Interior	337
XXXII.	The Aru Islands—Second Residence in Dobbo	361
XXXIII.	The Aru Islands—Physical Geography and Aspects of Nature	369
XXXIV.	New Guinea—Dorey	376
XXXV.	Voyage from Ceram to Waigiou	391
XXXVI.	Waigiou	400
XXXVII.	Voyage from Waigiou to Ternate	410
XXXVIII.	The Birds of Paradise	419
XXXIX.	Natural History of the Papuan Islands	440
XL.	The Races of Man in the Malay Archipelago	446
APPENDIX on Crania and Languages		459
INDEX		497

LIST OF ILLUSTRATIONS

		DRAWN ON WOOD BY	PAGE
1.	Orang-Utan attacked by Dyaks	WOLF	*Frontispiece*
2.	Rare Ferns on Mount Ophir. (*From specimens*)	FITCH	23
3.	Remarkable Bornean Beetles	ROBINSON	28
4.	Flying Frog. (*From a drawing by the Author*)	KEULEMANS	30
5.	Female Orang-Utan. (*From a photograph by Woodbury*)	WOLF	32
6.	Portrait of a Dyak Youth. (*From sketch and photographs*)	BAINES	50
7.	Dyak Suspension-bridge. (*From a sketch by the Author*)	FITCH	60
8.	Vanda Lowii. (*From specimens*)	FITCH	63
9.	Remarkable Forest-trees. (*From a sketch by the Author*)	FITCH	64
10.	Ancient Bas-relief. (*From a specimen in possession of the Author*)	BAINES	78
11.	Portrait of a Javanese Chief. (*From a photograph*)	BAINES	84
12.	The Calliper Butterfly (*Charaxes Kadenii*)	T. W. WOOD	87
13.	Primula imperialis. (*From specimens*)	FITCH	90
14.	Chief's House and Rice-shed in a Sumatran Village. (*From a photograph*)	ROBINSON	96
15.	Females of Papilio memnon	ROBINSON	98
16.	Papilio Coön	ROBINSON	99
17.	Leaf-butterfly in flight and repose	T. W. WOOD	101
18.	Female Hornbill and young bird	T. W. WOOD	105
19.	Grammatophyllum, a gigantic Orchid. (*From a sketch by the Author*)	FITCH	107
20.	Gun-boring in Lombock. (*From a sketch by the Author*)	BAINES	130

		DRAWN ON WOOD BY	PAGE
	Timor Men. (*From a photograph*)	BAINES	150
	Native Plough and Yoke, Macassar. (*From a sketch by the Author*)	BAINES	173
23.	Sugar Palms. (*From a sketch by the Author*)	FITCH	177
24.	Skull of the Babirusa	ROBINSON	212
25.	Peculiar form of Wings of Celebes Butterflies	WALLACE	216
26.	Ejecting an Intruder	BAINES	228
27.	Racquet-tailed Kingfisher	ROBINSON	229
28	"Wallace's Standard Wing," a new Bird of Paradise	KEULEMANS	253
29.	Sago Club	BAINES	290
30.	Sago-washing in Ceram. (*From a sketch by the Author*)	BAINES	290
31.	Sago Oven. (*From a sketch by the Author*)	BAINES	291
32.	Cuscus Ornatus, a Moluccan Marsupial	ROBINSON	302
33.	Moluccan Beetles	ROBINSON	307
34.	Natives shooting the Great Bird of Paradise	T. W. WOOD	337
35.	Great Black Cockatoo	T. W. WOOD	342
36.	Dobbo in the Trading Season. (*From a sketch by the Author*)	BAINES	360
37.	Male Brenthidæ fighting	ROBINSON	366
38.	Papuan, New Guinea	BAINES	379
39.	Papuan Pipe. (*From a sketch by the Author*)	BAINES	381
40.	Horned Flies	ROBINSON	383
41.	Clay-beater, used in New Guinea	ROBINSON	389
42.	The Red Bird of Paradise	T. W. WOOD	403
43.	My house at Bessir, Waigiou. (*From a sketch by the Author*)	BAINES	406
44.	Malay Anchor. (*From a sketch by the Author*)	BAINES	415
45.	The "Twelve-wired" and the "King" Birds of Paradise	KEULEMANS	419
46.	The Magnificent Bird of Paradise	KEULEMANS	428
47.	The Superb Bird of Paradise	KEULEMANS	429
48.	The Six-shafted Bird of Paradise	KEULEMANS	430
49.	The Long-tailed Bird of Paradise	KEULEMANS	433
50.	The Great Shielded Grasshopper	ROBINSON	444
51	Papuan Charm	ROBINSON	449

LIST OF ILLUSTRATIONS

MAPS

	PA[illegible]
Map showing Mr. Wallace's Route (tinted)	*Preface*
The British Isles and Borneo on the same scale	3
Physical Map (tinted)	8
Map of Minahasa, North Celebes	189
Map of Amboyna	225
Amboyna, with parts of Bouru and Ceram	2[illegible]
The Islands between Ceram and Ké	27[illegible]
Map of the Aru Islands	33[illegible]
Voyage from Ceram to Waigiou	392
Voyage from Waigiou to Ternate	411

INSTRUCTIONS TO THE BINDER

Route Map (tinted blue)	*at beginning of Preface*
Physical Map	*at page* 8
Orang-Utan attacked by Dyaks	*Frontispiece*
Remarkable Beetles, Borneo	*to face page* 28
Ejecting an Intruder	,, ,, 228
Wallace's Standard Wing, male and female	,, ,, 253
Moluccan Beetles	,, ,, 307
Natives shooting the Great Bird of Paradise	,, ,, 337
Dobbo in the Trading Season	,, ,, 360
The "Twelve-wired" and the "King" Birds of Paradise	*to face first page of* Chap. xxxviii

THE MALAY ARCHIPELAGO.

CHAPTER I.

PHYSICAL GEOGRAPHY.

If we look at a globe or a map of the Eastern hemisphere, we shall perceive between Asia and Australia a number of large and small islands, forming a connected group distinct from those great masses of land, and having little connexion with either of them. Situated upon the Equator, and bathed by the tepid water of the great tropical oceans, this region enjoys a climate more uniformly hot and moist than almost any other part of the globe, and teems with natural productions which are elsewhere unknown. The richest of fruits and the most precious of spices are here indigenous. It produces the giant flowers of the Rafflesia, the great green-winged Ornithoptera (princes among the butterfly tribes), the man-like Orang-Utan, and the gorgeous Birds of Paradise. It is inhabited by a peculiar and interesting race of mankind—the Malay, found nowhere beyond the limits of this insular tract, which has hence been named the Malay Archipelago.

To the ordinary Englishman this is perhaps the least known part of the globe. Our possessions in it are few and scanty; scarcely any of our travellers go to explore it; and in many collections of maps it is almost ignored, being divided between Asia and the Pacific Islands.[1] It thus happens that few persons realize that, as a whole, it is comparable with the primary divisions of the globe, and that some of its separate islands are larger than France or the Austrian empire. The traveller, however, soon acquires different ideas. He sails for days, or even for weeks, along the shores of one of these great islands, often so great that its inhabitants believe it to be a vast continent. He finds that voyages among these islands are commonly

[1] Since the establishment of the British North Borneo Company the region is more known, but the Dutch Colonies are still rarely visited.

reckoned by weeks and months, and that their several inhabitants are often as little known to each other as are the native races of the northern to those of the southern continent of America. He soon comes to look upon this region as one apart from the rest of the world with its own races of men and its own aspects of nature; with its own ideas, feelings, customs, and modes of speech, and with a climate, vegetation, and animated life altogether peculiar to itself.

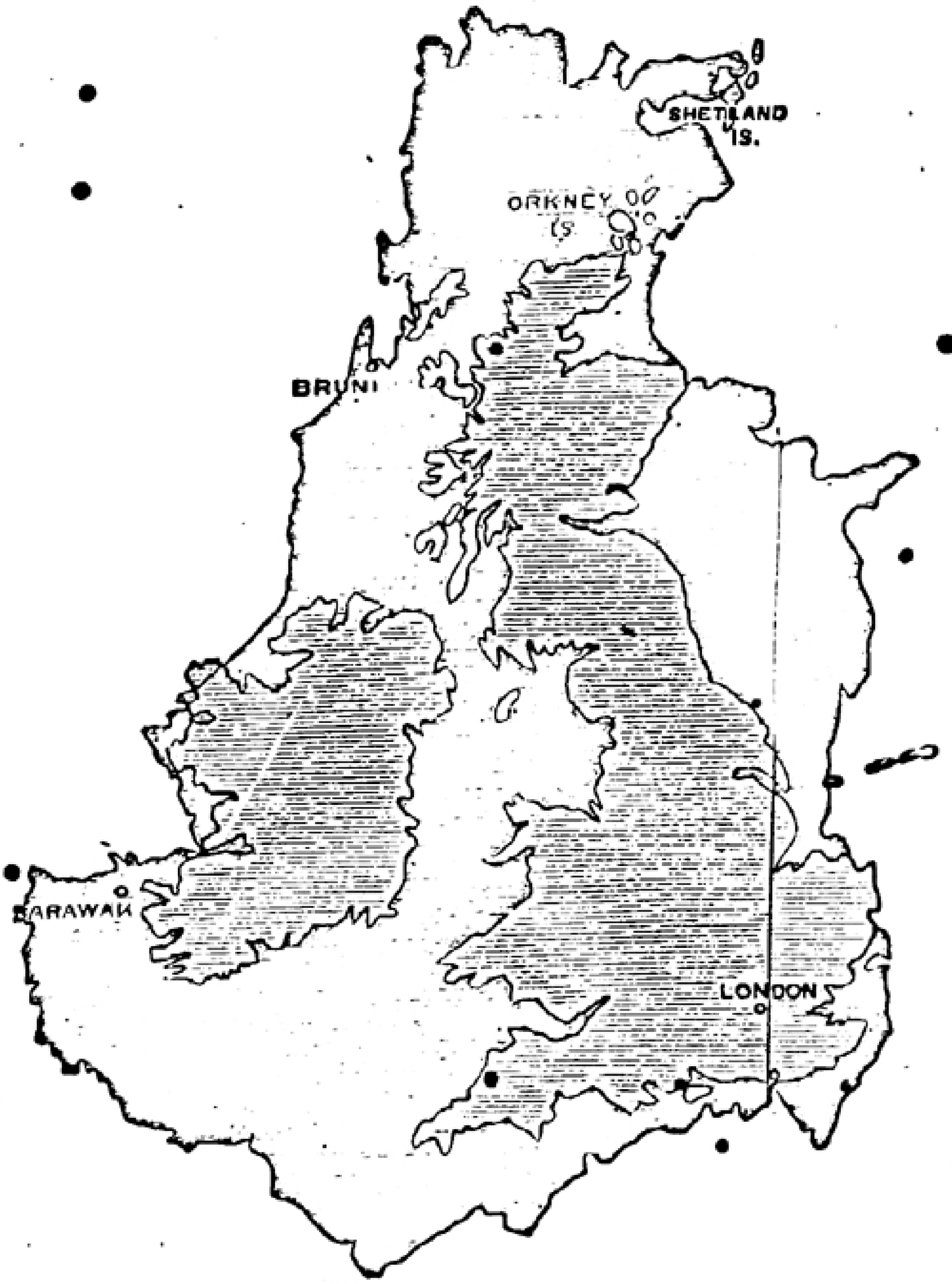
From many points of view these islands form one compact geographical whole, and as such they have always been treated by travellers and men of science; but a more careful and detailed study of them under various aspects, reveals the unexpected fact that they are divisible into two portions nearly equal in extent, which widely differ in their natural products, and really form parts of two of the primary divisions of the earth. I have been able to prove this in considerable detail by my observations on the natural history of the various parts of the Archipelago; and as in the description of my travels and residence in the several islands I shall have to refer continually to this view, and adduce facts in support of it, I have thought it advisable to commence with a general sketch of such of the main features of the Malayan region as will render the facts hereafter brought forward more interesting, and their bearing on the general question more easily understood. I proceed, therefore, to sketch the limits and extent of the Archipelago, and to point out the more striking features of its geology, physical geography, vegetation, and animal life.

Definition and Boundaries.—For reasons which depend mainly on the distribution of animal life, I consider the Malay Archipelago to include the Malay Peninsula as far as Tenasserim, and the Nicobar Islands on the west, the Philippines on the north, and the Solomon Islands beyond New Guinea, on the east. All the great islands included within these limits are connected together by innumerable smaller ones, so that no one of them seems to be distinctly separated from the rest. With but few exceptions, all enjoy an uniform and very similar climate, and are covered with a luxuriant forest vegetation. Whether we study their form and distribution on maps, or actually travel from island to island, our first impression will be that they form a connected whole, all the parts of which are intimately related to each other.

Extent of the Archipelago and Islands.—The Malay Archipelago extends for more than 4,000 miles in length from east to west, and is about 1,300 in breadth from north to south. It would stretch over an expanse equal to that of all Europe from the extreme west far into Central Asia, or would cover the widest parts of South America, and extend far beyond the land into the Pacific and Atlantic oceans. It includes three islands larger than Great Britain; and in one of them, Borneo, the whole of the British Isles might be set down, and would be surrounded

by a sea of forests. New Guinea, though less compact in shape, is probably larger than Borneo. Sumatra is about equal in extent to Great Britain; Java, Luzon, and Celebes are each about the size of Ireland. Eighteen more islands are, on the average, as large as Jamaica; more than a hundred are as large as the Isle of Wight; while the isles and islets of smaller size are innumerable.

The absolute extent of land in the Archipelago is not greater



THE BRITISH ISLES AND BORNEO ON THE SAME SCALE.

than that contained by Western Europe from Hungary to Spain; but, owing to the manner in which the land is broken up and divided, the variety of its productions is rather in proportion to the immense surface over which the islands are spread, than to the quantity of land which they contain.

Geological Contrasts.—One of the chief volcanic belts upon the globe passes through the Archipelago, and produces a striking contrast in the scenery of the volcanic and non-volcanic islands. A curving line marked out by scores of active and hundreds of extinct volcanoes, may be traced through the whole length of Sumatra and Java, and thence by the islands of Bali, Lombock, Sumbawa, Flores, the Serwatty Islands, Banda, Amboyna, Batchian, Makian, Tidore, Ternate, and Gilolo, to Morty Island. Here there is a slight but well-marked break, or shift, of about 200 miles to the westward, where the volcanic belt again begins, in North Celebes, and passes by Siau and Sanguir to the Philippine Islands, along the eastern side of which it continues, in a curving line, to their northern extremity. From the extreme eastern bend of this belt at Banda, we pass onwards for 1,000 miles over a non-volcanic district to the volcanoes observed by Dampier, in 1699, on the north-eastern coast of New Guinea, and can there trace another volcanic belt, through New Britain, New Ireland, and the Solomon Islands, to the eastern limits of the Archipelago.

In the whole region occupied by this vast line of volcanoes, and for a considerable breadth on each side of it, earthquakes are of continual recurrence, slight shocks being felt at intervals of every few weeks or months, while more severe ones, shaking down whole villages, and doing more or less injury to life and property, are sure to happen, in one part or another of this district, almost every year. In many of the islands the years of the great earthquakes form the chronological epochs of the native inhabitants, by the aid of which the ages of their children are remembered, and the dates of many important events are determined.

I can only briefly allude to the many fearful eruptions that have taken place in this region. In the amount of injury to life and property, and in the magnitude of their effects, they have not been surpassed by any upon record. Forty villages were destroyed by the eruption of Papandayang in Java, in 1772 when the whole mountain was blown up by repeated explosions, and a large lake left in its place. By the great eruption of Tomboro in Sumbawa, in 1815, 12,000 people were destroyed, and the ashes darkened the air and fell thickly upon the earth and sea for 300 miles round. Even quite recently, since I quitted the country, a mountain which had been quiescent for more than 200 years suddenly burst into activity. The island of Makian, one of the Moluccas, was rent open in 1646 by a violent eruption, which left a huge chasm on one side, extending into the heart of the mountain. When I last visited it, in 1860, it was clothed with vegetation to the summit, and contained twelve populous Malay villages. On the 29th of December, 1862, after 215 years of perfect inaction, it again suddenly burst forth, blowing up and completely altering the appearance of the mountain, destroying the greater part of the inhabitants, and sending forth such volumes of ashes as to darken the air at Ternate, forty

miles off, and to almost entirely destroy the growing crops on that and the surrounding islands.[1]

The island of Java contains more volcanoes, active and extinct, than any other known district of equal extent. They are about forty-five in number, and many of them exhibit most beautiful examples of the volcanic cone on a large scale, single or double, with entire or truncated summits, and averaging 10,000 feet high.

It is now well ascertained that almost all volcanoes have been slowly built up by the accumulation of matter—mud, ashes, and lava—ejected by themselves. The openings or craters, however, frequently shift their position; so that a country may be covered with a more or less irregular series of hills in chains and masses, only here and there rising into lofty cones, and yet the whole may be produced by true volcanic action. In this manner the greater part of Java has been formed. There has been some elevation, especially on the south coast, where extensive cliffs of coral limestone are found; and there may be a substratum of older stratified rocks; but still essentially Java is volcanic; and that noble and fertile island—the very garden of the East, and perhaps upon the whole the richest, the best cultivated, and the best governed tropical island in the world—owes its very existence to the same intense volcanic activity which still occasionally devastates its surface.

The great island of Sumatra exhibits in proportion to its extent a much smaller number of volcanoes, and a considerable portion of it has probably a non-volcanic origin.

To the eastward, the long string of islands from Java, passing by the north of Timor and away to Banda, are probably all due to volcanic action. Timor itself consists of ancient stratified rocks, but is said to have one volcano near its centre.

Going northward, Amboyna, a part of Bouru, and the west end of Ceram, the north part of Gilolo, and all the small islands around it, the northern extremity of Celebes, and the islands of Siau and Sanguir, are wholly volcanic. The Philippine Archipelago contains many active and extinct volcanoes, and has probably been reduced to its present fragmentary condition by subsidences attending on volcanic action.

All along this great line of volcanoes are to be found more or less palpable signs of upheaval and depression of land. The range of islands south of Sumatra, a part of the south coast of Java and of the islands east of it, the west and east end of

[1] More recently, in 1883, the volcanic island of Krakatoa was blown up in a terrific eruption, the sound of the explosions being heard at Ceylon, New Guinea, Manilla, and West Australia, while the ashes were spread over an area as large as the German Empire. The chief destruction was effected by great sea waves, which entirely destroyed many towns and villages on the coasts of Java and Sumatra, causing the death of between 30,000 and 40,000 persons. The atmospheric disturbance was so great that air-waves passed three and a quarter times round the globe, and the finer particles floating in the higher parts of the atmosphere produced remarkable colours in the sky at sunset for more than two years afterwards and in all parts of the world.

Timor, portions of all the Moluccas, the Ké and Aru Islands, Waigiou, and the whole south and east of Gilolo, consist in a great measure of upraised coral-rock, exactly corresponding to that now forming in the adjacent seas. In many places I have observed the unaltered surfaces of the elevated reefs, with great masses of coral standing up in their natural position, and hundreds of shells so fresh-looking that it was hard to believe that they had been more than a few years out of the water; and, in fact, it is very probable that such changes have occurred within a few centuries.

The united lengths of these volcanic belts is about ninety degrees, or one-fourth of the entire circumference of the globe. Their width is about fifty miles; but, for a space of two hundred on each side of them, evidences of subterranean action are to be found in recently elevated coral-rock, or in barrier coral-reefs, indicating recent submergence. In the very centre or focus of the great curve of volcanoes is placed the large island of Borneo, in which no sign of recent volcanic action has yet been observed, and where earthquakes, so characteristic of the surrounding regions, are entirely unknown. The equally large island of New Guinea occupies another quiescent area, on which no sign of volcanic action has yet been discovered. With the exception of the eastern end of its northern peninsula, the large and curiously-shaped island of Celebes is also entirely free from volcanoes; and there is some reason to believe that the volcanic portion has once formed a separate island. The Malay Peninsula is also non-volcanic.

The first and most obvious division of the Archipelago would therefore be into quiescent and volcanic regions, and it might, perhaps, be expected that such a division would correspond to some differences in the character of the vegetation and the forms of life. This is the case, however, to a very limited extent; and we shall presently see that, although this development of subterranean fires is on so vast a scale,—has piled up chains of mountains ten or twelve thousand feet high—has broken up continents and raised up islands from the ocean,—yet it has all the character of a recent action, which has not yet succeeded in obliterating the traces of a more ancient distribution of land and water.

Contrasts of Vegetation.—Placed immediately upon the Equator and surrounded by extensive oceans, it is not surprising that the various islands of the Archipelago should be almost always clothed with a forest vegetation from the level of the sea to the summits of the loftiest mountains. This is the general rule. Sumatra, New Guinea, Borneo, the Philippines and the Moluccas, and the uncultivated parts of Java and Celebes, are all forest countries, except a few small and unimportant tracts, due perhaps, in some cases, to ancient cultivation or accidental fires. To this, however, there is one important exception in the island of Timor and all the smaller islands around it, in which

there is absolutely no forest such as exists in the other islands and this character extends in a lesser degree to Flores, Sumbawa, Lombock, and Bali.

In Timor the most common trees are Eucalypti of several species, so characteristic of Australia, with sandal-wood, acacia, and other sorts in less abundance. These are scattered over the country more or less thickly, but never so as to deserve the name of a forest. Coarse and scanty grasses grow beneath them on the more barren hills, and a luxuriant herbage in the moister localities. In the islands between Timor and Java there is often a more thickly wooded country, abounding in thorny and prickly trees. These seldom reach any great height, and during the force of the dry season they almost completely lose their leaves, allowing the ground beneath them to be parched up, and contrasting strongly with the damp, gloomy, ever-verdant forests of the other islands. This peculiar character, which extends in a less degree to the southern peninsula of Celebes and the east end of Java, is most probably owing to the proximity of Australia. The south-east monsoon, which lasts for about two-thirds of the year (from March to November), blowing over the northern parts of that country, produces a degree of heat and dryness which assimilates the vegetation and physical aspect of the adjacent islands to its own. A little further eastward in Timor-laut and the Ké Islands, a moister climate prevails, the south-east winds blowing from the Pacific through Torres Straits and over the damp forests of New Guinea, and as a consequence every rocky islet is clothed with verdure to its very summit. Further west again, as the same dry winds blow over a wider and wider extent of ocean, they have time to absorb fresh moisture, and we accordingly find the island of Java possessing a less and less arid climate, till in the extreme west near Batavia rain occurs more or less all the year round, and the mountains are everywhere clothed with forests of unexampled luxuriance.

Contrasts in Depth of Sea.—It was first pointed out by Mr. George Windsor Earl, in a paper read before the Royal Geographical Society in 1845, and subsequently in a pamphlet *On the Physical Geography of South-Eastern Asia and Australia*, dated 1855, that a shallow sea connected the great islands of Sumatra, Java, and Borneo with the Asiatic continent, with which their natural productions generally agreed; while a similar shallow sea connected New Guinea and some of the islands adjacent to Australia, all being characterized by the presence of marsupials.

We have here a clue to the most radical contrast in the Archipelago, and by following it out in detail I have arrived at the conclusion that we can draw a line among the islands, which shall so divide them that one-half shall truly belong to Asia, while the other shall no less certainly be allied to Australia. I term these respectively the Indo-Malayan, and the

Austro-Malayan divisions of the Archipelago. (*See* Physical Map.)

In Mr. Earl's pamphlet, however, he argues in favour of the former land-connexion of Asia and Australia, whereas it appears to me that the evidence, taken as a whole, points to their long-continued separation. Notwithstanding this and other important differences between us, to him undoubtedly belongs the merit of first indicating the division of the Archipelago into an Australian and an Asiatic region, which it has been my good fortune to establish by more detailed observations.

Contrasts in Natural Productions.—To understand the importance of this class of facts, and its bearing upon the former distribution of land and sea, it is necessary to consider the results arrived at by geologists and naturalists in other parts of the world.

It is now generally admitted that the present distribution of living things on the surface of the earth is mainly the result of the last series of changes that it has undergone. Geology teaches us that the surface of the land and the distribution of land and water is everywhere slowly changing. It further teaches us that the forms of life which inhabit that surface have, during every period of which we possess any record, been also slowly changing.

It is not now necessary to say anything about *how* either of those changes took place; as to that, opinions may differ; but as to the fact that the changes themselves *have* occurred, from the earliest geological ages down to the present day, and are still going on, there is no difference of opinion. Every successive stratum of sedimentary rock, sand, or gravel, is a proof that changes of level have taken place; and the different species of animals and plants, whose remains are found in these deposits, prove that corresponding changes did occur in the organic world.

Taking, therefore, these two series of changes for granted, most of the present peculiarities and anomalies in the distribution of species may be directly traced to them. In our own islands, with a very few trifling exceptions, every quadruped, bird, reptile, insect, and plant, is found also on the adjacent continent. In the small islands of Sardinia and Corsica, there are some quadrupeds and insects, and many plants, quite peculiar. In Ceylon, more closely connected to India than Britain is to Europe, many animals and plants are different from those found in India, and peculiar to the island. In the Galapagos Islands, almost every indigenous living thing is peculiar to them, though closely resembling other kinds found in the nearest parts of the American continent.

Most naturalists now admit that these facts can only be explained by the greater or less lapse of time since the islands were upraised from beneath the ocean, or were separated from the nearest land; and this will be generally (though not always) indicated by the depth of the intervening sea. The enormous

hipelago. (*See* Physical

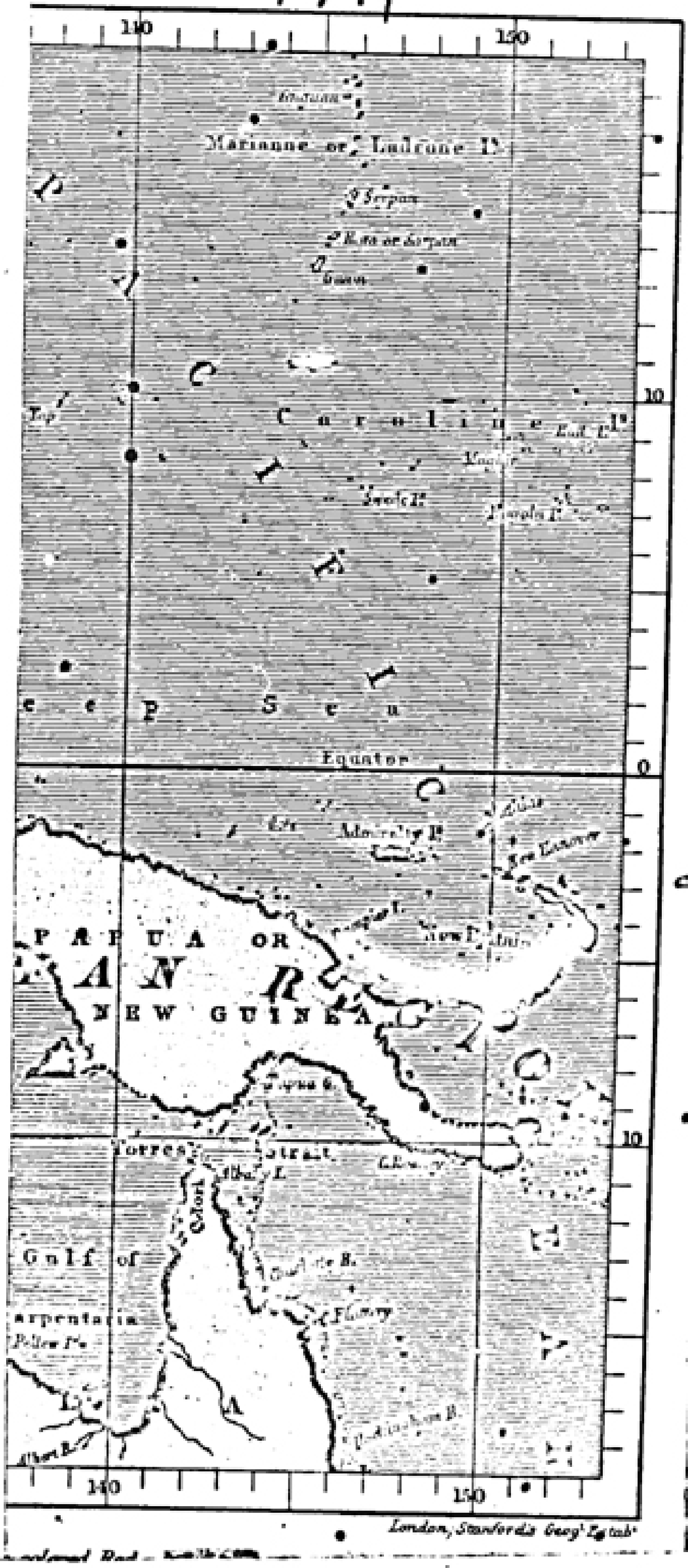
argues in favour of the l Australia, whereas it en as a whole, points to twithstanding this and us, to him undoubtedly ne division of the Archi- Asiatic region, which it blish by more detailed

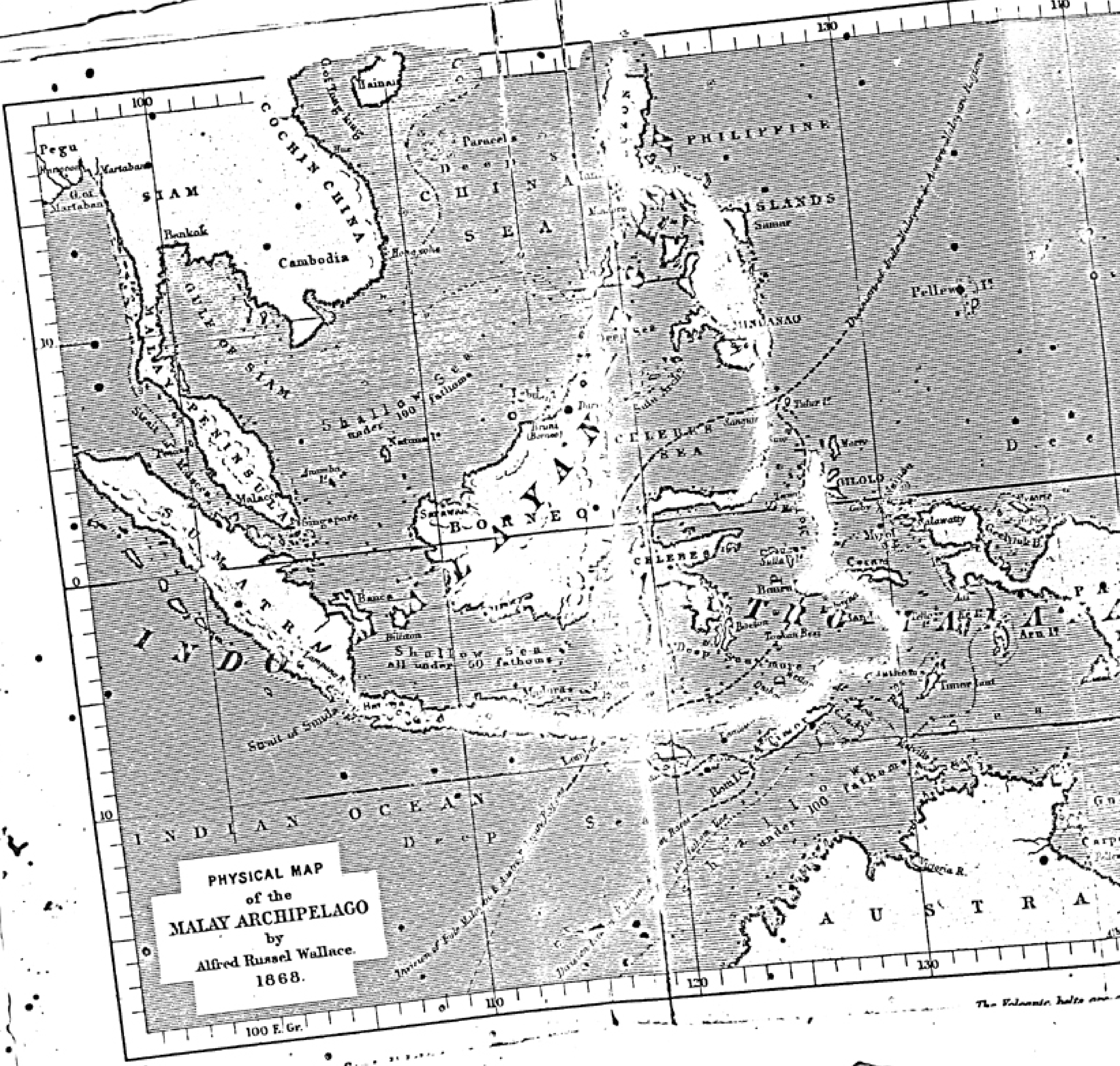
nderstand the importance n the former distribution der the results arrived at parts of the world.

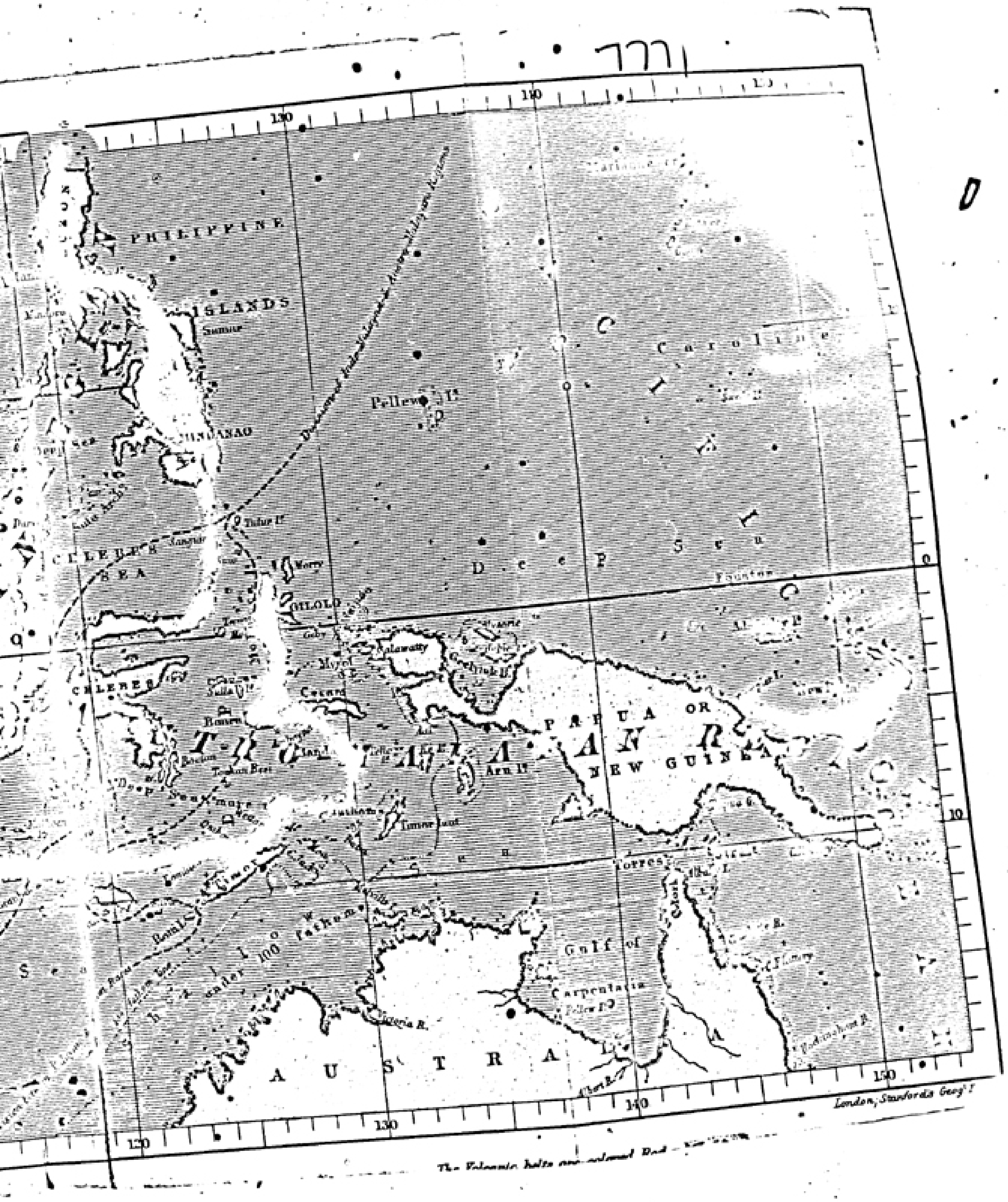
e present distribution of h is mainly the result of ergone. Geology teaches distribution of land and It further teaches us that rface have, during every een also slowly changing. ning about *how* either of opinions may differ; but elves *have* occurred, from he present day, and are pinion. Every successive r gravel, is a proof that d the different species of found in these deposits, id occur in the organic

changes for granted, most lies in the distribution of In our own islands, with quadruped, bird, reptile, adjacent continent. In ica, there are some quad- uite peculiar. In Ceylon, ritain is to Europe, many those found in India, and gos Islands, almost every them, though closely re- est parts of the American

ese facts can only be ex- ime since the islands were were separated from the y (though not always) in- ning sea. The enormous




PHYSICAL MAP
of the
MALAY ARCHIPELAGO
by
Alfred Russel Wallace.
1868.
Pegu
Martaban
G. of Martaban
SIAM
Bankok
COCHIN CHINA
Cambodia
Hainan
Paracels
CHINA SEA
Deep Sea
GULF OF SIAM
MALAY PENINSULA
Malacca
Singapore
Shallow Sea under 100 fathoms
PHILIPPINE ISLANDS
Samar
MINDANAO
Pellew I.
CELEBES SEA
BORNEO
Sarawak
CELEBES
Banca
Billiton
Shallow Sea all under 50 fathoms
SUMATRA
Strait of Sunda
INDIAN OCEAN
Deep Sea
Gilolo
Bouru
Timor Laut
Aru Is.
AUSTRALIA
Victoria R.
100 E. Gr.
110
120
130



PHILIPPINE
ISLANDS
Pellew Is
C a r o l i n e
D e e p S e a
CELEBES SEA
PAPUA OR
NEW GUINEA
Aru Is
Timor Laut
Torres
Gulf of
Carpentaria
A U S T R A
Victoria R.
London, Stanford's Geog' Est

thickness of many marine deposits through wide areas show that subsidence has often continued (with intermitting period of repose) during epochs of immense duration. The depth c sea produced by such subsidence will therefore generally be measure of time; and in like manner the change which organi forms have undergone is a measure of time. When we mak proper allowance for the continued introduction of new animal and plants from surrounding countries, by those natural mean of dispersal which have been so well explained by Sir Charle Lyell and Mr. Darwin, it is remarkable how closely these two measures correspond. Britain is separated from the continent by a very shallow sea, and only in a very few cases have ou animals or plants begun to show a difference from the corre sponding continental species. Corsica and Sardinia, divided from Italy by a much deeper sea, present a much greater difference in their organic forms. Cuba, separated from Yucatan by a wider and deeper strait, differs more markedly, so that most of its productions are of distinct and peculiar species; while Madagascar, divided from Africa by a deep channel three hundred miles wide, possesses so many peculiar features as to indicate separation at a very remote antiquity, or even to render it doubtful whether the two countries have ever been absolutely united.

Returning now to the Malay Archipelago, we find that all the wide expanse of sea which divides the islands of Java, Sumatra, and Borneo from each other, and from Malacca and Siam, is so shallow that ships can anchor in any part of it, since it rarely exceeds forty fathoms in depth; and if we go as far as the line of a hundred fathoms, we shall include the Philippine Islands and Bali, east of Java. If, therefore, these islands have been separated from each other and the continent by subsidence of the intervening tracts of land, we should conclude that the separation has been comparatively recent, since the depth to which the land has subsided is so small. It is also to be remarked, that the great chain of active volcanoes in Sumatra and Java furnishes us with a sufficient cause for such subsidence, since the enormous masses of matter they have thrown out would take away the foundations of the surrounding district; and this may be the true explanation of the often-noticed fact, that volcanoes and volcanic chains are always near the sea. The subsidence they produce around them will, in time, make a sea, if one does not already exist.[1]

But it is when we examine the zoology of these countries that we find what we most require—evidence of a very striking character that these great islands must have once formed a part of the continent, and could only have been separated at a very recent ge...logical epoch. The elephant and tapir of Sumatra and Borneo, ... hinoceros of Sumatra and the allied species of Java,

1 It it n... ved by most geologists that subsidence is produced by the weight of every fresl... t of mat...als either in the sea or on the land. Accumulations of rock or ash... volcano... would, therefore, be itself a cause of subsidence.

the wild cattle of Borneo and the kind long supposed to be peculiar to Java, are now all known to inhabit some part or other of Southern Asia. None of these large animals could possibly have passed over the arms of the sea which now separate these countries, and their presence plainly indicates that a land communication must have existed since the origin of the species. Among the smaller mammals a considerable portion are common to each island and the continent; but the vast physical changes that must have occurred during the breaking up and subsidence of such extensive regions have led to the extinction of some in one or more of the islands, and in some cases there seems also to have been time for a change of species to have taken place. Birds and insects illustrate the same view, for every family, and almost every genus of these groups found in any of the islands, occurs also on the Asiatic continent, and in a great number of cases the species are exactly identical. Birds offer us one of the best means of determining the law of distribution; for though at first sight it would appear that the watery boundaries which keep out the land quadrupeds could be easily passed over by birds, yet practically it is not so; for if we leave out the aquatic tribes which are pre-eminently wanderers, it is found that the others (and especially the Passeres, or true perching-birds, which form the vast majority) are often as strictly limited by straits and arms of the sea as are quadrupeds themselves. As an instance, among the islands of which I am now speaking, it is a remarkable fact that Java possesses numerous birds which never pass over to Sumatra, though they are separated by a strait only fifteen miles wide, and with islands in mid-channel. Java, in fact, possesses more birds and insects peculiar to itself than either Sumatra or Borneo, and this would indicate that it was earliest separated from the continent; next in organic individuality is Borneo, while Sumatra is so nearly identical in all its animal forms with the peninsula of Malacca, that we may safely conclude it to have been the most recently dismembered island.

The general result therefore at which we arrive is, that the great islands of Java, Sumatra, and Borneo, resemble in their natural productions the adjacent parts of the continent, almost as much as such widely-separated districts could be expected to do even if they still formed a part of Asia; and this close resemblance, joined with the fact of the wide extent of sea which separates them being so uniformly and remarkably shallow, and lastly, the existence of the extensive range of volcanoes in Sumatra and Java, which have poured out vast quantities of subterranean matter and have built up extensive plateaux and lofty mountain ranges, thus furnishing a *vera causa* for a parallel line of subsidence—all lead irresistibly to the conclusion that at a very recent geological epoch the continent of Asia extended far beyond its present limits in a south-easterly direction including the islands of Java, Sumatra, and Borneo, and

probably reaching as far as the present 100-fathom line of soundings.

The Philippine Islands agree in many respects with Asia and the other islands, but present some anomalies, which seem to indicate that they were separated at an earlier period, and have since been subject to many revolutions in their physical geography.

Turning our attention now to the remaining portion of the Archipelago, we shall find that all the islands from Celebes and Lombock eastward exhibit almost as close a resemblance to Australia and New Guinea as the Western Islands do to Asia. It is well known that the natural productions of Australia differ from those of Asia more than those of any of the four ancient quarters of the world differ from each other. Australia, in fact, stands alone: it possesses no apes or monkeys, no cats or tigers, wolves, bears, or hyenas; no deer or antelopes, sheep or oxen; no elephant, horse, squirrel, or rabbit; none, in short, of those familiar types of quadruped which are met with in every other part of the world. Instead of these, it has Marsupials only, kangaroos and opossums, wombats and the duck-billed Platypus. In birds it is almost as peculiar. It has no woodpeckers and no pheasants, families which exist in every other part of the world; but instead of them it has the mound-making brush-turkeys, the honeysuckers, the cockatoos, and the brush-tongued lories, which are found nowhere else upon the globe. All these striking peculiarities are found also in those islands which form the Austro-Malayan division of the Archipelago.

The great contrast between the two divisions of the Archipelago is nowhere so abruptly exhibited as on passing from the island of Bali to that of Lombock, where the two regions are in closest proximity. In Bali we have barbets, fruit-thrushes, and woodpeckers; on passing over to Lombock these are seen no more, but we have abundance of cockatoos, honeysuckers, and brush-turkeys, which are equally unknown in Bali,[1] or any island further west. The strait is here fifteen miles wide, so that we may pass in two hours from one great division of the earth to another, differing as essentially in their animal life as Europe does from America. If we travel from Java or Borneo to Celebes or the Moluccas, the difference is still more striking. In the first, the forests abound in monkeys of many kinds, wild cats, deer, civets, and otters, and numerous varieties of squirrels are constantly met with. In the latter none of these occur; but the prehensile-tailed cuscus is almost the only terrestrial mammal seen, except wild pigs, which are found in all the islands, and deer (which have probably been recently introduced) in Celebes and the Moluccas. The birds which are most abundant in the Western Islands are woodpeckers, barbets, trogons, fruit-

[1] I was informed, however, that there were a few cockatoos at one spot on the west of Bali, showing that the intermingling of the productions of these islands is now going on.

thrushes, and leaf-thrushes: they are seen daily, and form the great ornithological features of the country. In the Eastern islands these are absolutely unknown, honeysuckers and small lories being the most common birds; so that the naturalist feels himself in a new world, and can hardly realize that he has passed from the one region to the other in a few days, without ever being out of sight of land.

The inference that we must draw from these facts is undoubtedly, that the whole of the islands eastwards beyond Java and Borneo, with the exception, perhaps, of Celebes, do essentially form a part of a former Australian or Pacific continent, although some of them may never have been actually joined to it. This continent must have been broken up not only before the Western Islands were separated from Asia, but probably before the extreme south-eastern portion of Asia was raised above the waters of the ocean; for a great part of the land of Borneo and Java is known to be geologically of quite recent formation, while the very great difference of species, and in many cases of genera also, between the productions of the Eastern Malay Islands and Australia, as well as the great depth of the sea now separating them, all point to a comparatively long period of isolation.

It is interesting to observe among the islands themselves, how a shallow sea always intimates a recent land-connexion. The Aru Islands, Mysol, and Waigiou, as well as Jobie, agree with New Guinea in their species of mammalia and birds much more closely than they do with the Moluccas, and we find that they are all united to New Guinea by a shallow sea. In fact, the 100-fathom line round New Guinea marks out accurately the range of the true Paradise birds.

It is further to be noted—and this is a very interesting point in connexion with theories of the dependence of special forms of life on external conditions—that this division of the Archipelago into two regions characterized by a striking diversity in their natural productions, does not in any way correspond to the main physical or climatal divisions of the surface. The great volcanic chain runs through both parts, and appears to produce no effect in assimilating their productions. Borneo closely resembles New Guinea, not only in its vast size and its freedom from volcanoes, but in its variety of geological structure, its uniformity of climate, and the general aspect of the forest vegetation that clothes its surface. The Moluccas are the counterpart of the Philippines in their volcanic structure, their extreme fertility, their luxuriant forests, and their frequent earthquakes; and Bali with the east end of Java has a climate almost as dry and a soil almost as arid as that of Timor. Yet between these corresponding groups of islands, constructed as it were after the same pattern, subjected to the same climate, and bathed by the same oceans, there exists the greatest possible contrasts when we compare their animal productions. Nowhere

does the ancient doctrine—that differences or similarities in the various forms of life that inhabit different countries are due to corresponding physical differences or similarities in the countries themselves—meet with so direct and palpable a contradiction. Borneo and New Guinea, as alike physically as two distinct countries can be, are zoologically wide as the poles asunder; while Australia, with its dry winds, its open plains, its stony deserts, and its temperate climate, yet produces birds and quadrupeds which are closely related to those inhabiting the hot, damp, luxuriant forests which everywhere clothe the plains and mountains of New Guinea.

In order to illustrate more clearly the means by which I suppose this great contrast has been brought about, let us consider what would occur if two strongly contrasted divisions of the earth were, by natural means brought into proximity. No two parts of the world differ so radically in their productions as Asia and Australia, but the difference between Africa and South America is also very great, and these two regions will well serve to illustrate the question we are considering. On the one side we have baboons, lions, elephants, buffaloes, and giraffes; on the other spider-monkeys, pumas, tapirs, ant-eaters, and sloths; while among birds, the hornbills, turacos, orioles, and honeysuckers of Africa contrast strongly with the toucans, macaws, chatterers, and humming-birds of America.

Now let us endeavour to imagine that a slow upheaval of the bed of the Altantic should take place, while at the same time earthquake-shocks and volcanic action on the land should cause increased volumes of sediment to be poured down by the rivers, so that the two continents should gradually spread out by the addition of newly-formed lands, and thus reduce the Atlantic which now separates them to an arm of the sea a few hundred miles wide. At the same time we may suppose islands to be upheaved in mid-channel; and, as the subterranean forces varied in intensity, and shifted their points of greatest action, these islands would sometimes become connected with the land on one side or other of the strait, and at other times again be separated from it. Several islands would at one time be joined together, at another would be broken up again, till at last, after many long ages of such intermittent action, we might have an irregular archipelago of islands filling up the ocean channel of the Atlantic, in whose appearance and arrangement we could discover nothing to tell us which had been connected with Africa and which with America. The animals and plants inhabiting these islands would, however, certainly reveal this portion of their former history. On those islands which had ever formed a part of the South American continent we should be sure to find such common birds as chatterers and toucans and humming-birds, and some of the peculiar American quadrupeds; while on those which had been separated from Africa, hornbills, orioles, and honeysuckers would as certainly be found. Some portion of

the upraised land might at different times have had a temporary connexion with both continents, and would then contain a certain amount of mixture in its living inhabitants. Such seems to have been the case with the islands of Celebes and the Philippines. Other islands, again, though in such close proximity as Bali and Lombock, might each exhibit an almost unmixed sample of the productions of the continents of which they had directly or indirectly once formed a part.

In the Malay Archipelago we have, I believe, a case exactly parallel to that which I have here supposed. We have indications of a vast continent, with a peculiar fauna and flora, having been gradually and irregularly broken up; the island of Celebes probably marking its furthest westward extension, beyond which was a wide ocean.[1] At the same time Asia appears to have been extending its limits in a south-east direction, first in an unbroken mass, then separated into islands as we now see it, and almost coming into actual contact with the scattered fragments of the great southern land.

From this outline of the subject, it will be evident how important an adjunct Natural History is to Geology; not only in interpreting the fragments of extinct animals found in the earth's crust, but in determining past changes in the surface which have left no geological record. It is certainly a wonderful and unexpected fact, that an accurate knowledge of the distribution of birds and insects should enable us to map out lands and continents which disappeared beneath the ocean long before the earliest traditions of the human race. Wherever the geologist can explore the earth's surface, he can read much of its past history, and can determine approximately its latest movements above and below the sea-level; but wherever oceans and seas now extend, he can do nothing but speculate on the very limited data afforded by the depth of the waters. Here the naturalist steps in, and enables him to fill up this great gap in the past history of the earth.

One of the chief objects of my travels was to obtain evidence of this nature; and my search after such evidence has been rewarded by great success, so that I have been enabled to trace out with some probability the past changes which one of the most interesting parts of the earth has undergone. It may be thought that the facts and generalizations here given, would have been more appropriately placed at the end rather than at the beginning of a narrative of the travels which supplied the facts. In some cases this might be so, but I have found it impossible to give such an account as I desire of the natural history of the numerous islands and groups of islands in the Archipelago, without constant reference to these generalizations which add

[1] Further study of the subject has led me to conclude that Celebes never formed part of the Austro-Malayan land, but that it more probably indicates the furthest eastward extension of the Asiatic continent at a very early period. (See the author's *Island Life*, p. 427.)

so much to their interest. Having given this general sketch of the subject, I shall be able to show how the same principles can be applied to the individual islands of a group as to the whole Archipelago; and make my account of the many new and curious animals which inhabit them both more interesting and more instructive than if treated as mere isolated facts.

Contrasts of Races.—Before I had arrived at the conviction that the eastern and western halves of the Archipelago belonged to distinct primary regions of the earth, I had been led to group the natives of the Archipelago under two radically distinct races. In this I differed from most ethnologists who had before written on the subject; for it had been the almost universal custom to follow William von Humboldt and Pritchard, in classing all the Oceanic races as modifications of one type. Observation soon showed me, however, that Malays and Papuans differed radically in every physical, mental, and moral character; and more detailed research, continued for eight years, satisfied me that under these two forms, as types, the whole of the peoples of the Malay Archipelago and Polynesia could be classified. On drawing the line which separates these races, it is found to come near to that which divides the zoological regions, but somewhat eastward of it; a circumstance which appears to me very significant of the same causes having influenced the distribution of mankind that have determined the range of other animal forms.

The reason why exactly the same line does not limit both is sufficiently intelligible. Man has means of traversing the sea which animals do not possess; and a superior race has power to press out or assimilate an inferior one. The maritime enterprise and higher civilization of the Malay races have enabled them to overrun a portion of the adjacent region, in which they have entirely supplanted the indigenous inhabitants if it ever possessed any; and to spread much of their language, their domestic animals, and their customs far over the Pacific, into islands where they have but slightly, or not at all, modified the physical or moral characteristics of the people.

I believe, therefore, that all the peoples of the various islands can be grouped either with the Malays or the Papuans; and that these two have no traceable affinity to each other. I believe, further, that all the races east of the line I have drawn have more affinity for each other than they have for any of the races west of that line;—that, in fact, the Asiatic races include the Malays, and all have a continental origin, while the races of Papuan type, including all to the east of the former, as far as the Fiji Islands, are derived, not from any existing continent, but from lands which now exist or have recently existed in the Pacific Ocean. These preliminary observations will enable the reader better to apprehend the importance I attach to the details of physical form or moral character, which I shall give in describing the inhabitants of many of the islands.

CHAPTER II.

SINGAPORE.

(A SKETCH OF THE TOWN AND ISLAND AS SEEN DURING SEVERAL VISITS FROM 1854 TO 1862.)

FEW places are more interesting to a traveller from Europe than the town and island of Singapore, furnishing, as it does, examples of a variety of Eastern races, and of many different religions and modes of life. The government, the garrison, and the chief merchants are English; but the great mass of the population is Chinese, including some of the wealthiest merchants, the agriculturists of the interior, and most of the mechanics and labourers. The native Malays are usually fishermen and boatmen, and they form the main body of the police. The Portuguese of Malacca supply a large number of the clerks and smaller merchants. The Klings of Western India are a numerous body of Mahometans, and, with many Arabs, are petty merchants and shopkeepers. The grooms and washermen are all Bengalees, and there is a small but highly respectable class of Parsee merchants. Besides these, there are numbers of Javanese sailors and domestic servants, as well as traders from Celebes, Bali, and many other islands of the Archipelago. The harbour is crowded with men-of-war and trading vessels of many European nations, and hundreds of Malay praus and Chinese junks, from vessels of several hundred tons burthen down to little fishing boats and passenger sampans; and the town comprises handsome public buildings and churches, Mahometan mosques Hindoo temples, Chinese joss-houses, good European houses massive warehouses, queer old Kling and China bazaars, and long suburbs of Chinese and Malay cottages.

By far the most conspicuous of the various kinds of people in Singapore, and those which most attract the stranger's attention, are the Chinese, whose numbers and incessant activity give the place very much the appearance of a town in China. The Chinese merchant is generally a fat round-faced man with an important and business-like look. He wears the same style of clothing (loose white smock, and blue or black trousers) as the meanest coolie, but of finer materials, and is always clean and neat; and his long tail tipped with red silk hangs down to his heels. He has a handsome warehouse or shop in town and a good house in the country. He keeps a fine horse and gig, and every evening may be seen taking a drive bareheaded to enjoy the cool breeze. He is rich, he owns several retail shops and trading schooners, he lends money at high interest and on good security, he makes hard bargains and gets fatter and richer every year.

In the Chinese bazaar are hundreds of small shops in which a

miscellaneous collection of hardware and dry goods are to be found, and where many things are sold wonderfully cheap. You may buy gimlets at a penny each, white cotton thread at four balls for a halfpenny, and penknives, corkscrews, gunpowder, writing-paper, and many other articles as cheap or cheaper than you can purchase them in England. The shopkeeper is very good-natured; he will show you everything he has, and does not seem to mind if you buy nothing. He bates a little, but not so much as the Klings, who almost always ask twice what they are willing to take. If you buy a few things of him, he will speak to you afterwards every time you pass his shop, asking you to walk in and sit down, or take a cup of tea, and you wonder how he can get a living where so many sell the same trifling articles. The tailors sit *at* a table, not *on* one; and both they and the shoemakers work well and cheaply. The barbers have plenty to do, shaving heads and cleaning ears; for which latter operation they have a great array of little tweezers, picks, and brushes. In the outskirts of the town are scores of carpenters and blacksmiths. The former seem chiefly to make coffins and highly painted and decorated clothes-boxes. The latter are mostly gun-makers, and bore the barrels of guns by hand, out of solid bars of iron. At this tedious operation they may be seen every day, and they manage to finish off a gun with a flint lock very handsomely. All about the streets are sellers of water, vegetables, fruit, soup, and agar-agar (a jelly made of seaweed), who have many cries as unintelligible as those of London. Others carry a portable cooking-apparatus on a pole balanced by a table at the other end, and serve up a meal of shell-fish, rice, and vegetables for two or three halfpence; while coolies and boatmen waiting to be hired are everywhere to be met with.

In the interior of the island the Chinese cut down forest trees in the jungle, and saw them up into planks; they cultivate vegetables, which they bring to market; and they grow pepper and gambir, which form important articles of export. The French Jesuits have established missions among these inland Chinese, which seem very successful. I lived for several weeks at a time with the missionary at Bukit-tima, about the centre of the island, where a pretty church has been built and there are about 300 converts. While there, I met a missionary who had just arrived from Tonquin, where he had been living for many years. The Jesuits still do their work thoroughly as of old. In Cochin China, Tonquin, and China, where all Christian teachers are obliged to live in secret, and are liable to persecution, expulsion, and sometimes death,[1] every province, even those farthest in the interior, has a permanent Jesuit mission establishment, constantly kept up by fresh aspirants, who are taught the languages of the countries they are going to at Penang or Singapore. In China there are said to be near a million converts; in

[1] Since the French settlement in Cochin China this is no longer the case.

Tonquin and Cochin China, more than half a million. One secret of the success of these missions is the rigid economy practised in the expenditure of the funds. A missionary is allowed about 30*l.* a year, on which he lives in whatever country he may be. This renders it possible to support a large number of missionaries with very limited means; and the natives, seeing their teachers living in poverty and with none of the luxuries of life, are convinced that they are sincere in what they teach, and have really given up home and friends and ease and safety for the good of others. No wonder they make converts, for it must be a great blessing to the poor people among whom they labour to have a man among them to whom they can go in any trouble or distress, who will comfort and advise them, who visits them in sickness, who relieves them in want, and who devotes his whole life to their instruction and welfare.

My friend at Bukit-tima was truly a father to his flock. He preached to them in Chinese every Sunday, and had evenings for discussion and conversation on religion during the week. He had a school to teach their children. His house was open to them day and night. If a man came to him and said, "I have no rice for my family to eat to-day," he would give him half of what he had in the house, however little that might be. If another said, "I have no money to pay my debt," he would give him half the contents of his purse, were it his last dollar. So, when he was himself in want, he would send to some of the wealthiest among his flock, and say, "I have no rice in the house," or "I have given away my money, and am in want of such and such articles." The result was that his flock trusted and loved him, for they felt sure that he was their true friend, and had no ulterior designs in living among them.

The island of Singapore consists of a multitude of small hills, three or four hundred feet high, the summits of many of which are still covered with virgin forest. The mission-house at Bukit-tima was surrounded by several of these wood-topped hills, which were much frequented by wood-cutters and sawyers, and offered me an excellent collecting ground for insects. Here and there, too, were tiger pits, carefully covered over with sticks and leaves, and so well concealed, that in several cases I had a narrow escape from falling into them. They are shaped like an iron furnace, wider at the bottom than the top, and are perhaps fifteen or twenty feet deep, so that it would be almost impossible for a person unassisted to get out of one. Formerly a sharp stake was stuck erect in the bottom; but after an unfortunate traveller had been killed by falling on one, its use was forbidden. There are always a few tigers roaming about Singapore, and they kill on an average a Chinaman every day, principally those who work in the gambir plantations, which are always made in newly-cleared jungle. We heard a tiger roar once or twice in the evening, and it was rather nervous work hunting for insects

among the fallen trunks and old sawpits, when one of these savage animals might be lurking close by, waiting an opportunity to spring upon us.

Several hours in the middle of every fine day were spent in these patches of forest, which were delightfully cool and shady by contrast with the bare open country we had to walk over to reach them. The vegetation was most luxuriant, comprising enormous forest trees, as well as a variety of ferns, caladiums, and other undergrowth, and abundance of climbing rattan palms. Insects were exceedingly abundant and very interesting, and every day furnished scores of new and curious forms. In about two months I obtained no less than 700 species of beetles, a large proportion of which were quite new, and among them were 130 distinct kinds of the elegant Longicorns (Cerambycidæ), so much esteemed by collectors. Almost all these were collected in one patch of jungle, not more than a square mile in extent, and in all my subsequent travels in the East I rarely if ever met with so productive a spot. This exceeding productiveness was due in part no doubt to some favourable conditions in the soil, climate, and vegetation, and to the season being very bright and sunny, with sufficient showers to keep everything fresh. But it was also in a great measure dependent, I feel sure, on the labours of the Chinese wood-cutters. They had been at work here for several years, and during all that time had furnished a continual supply of dry and dead and decaying leaves and bark, together with abundance of wood and sawdust, for the nourishment of insects and their larvæ. This had led to the assemblage of a great variety of species in a limited space, and I was the first naturalist who had come to reap the harvest they had prepared. In the same place, and during my walks in other directions, I obtained a fair collection of butterflies and of other orders of insects, so that on the whole I was quite satisfied with these my first attempts to gain a knowledge of the Natural History of the Malay Archipelago.

CHAPTER III.

MALACCA AND MOUNT OPHIR.

(JULY TO SEPTEMBER, 1854.)

BIRDS and most other kinds of animals being scarce at Singapore, I left it in July for Malacca, where I spent more than two months in the interior, and made an excursion to Mount Ophir. The old and picturesque town of Malacca is crowded along the banks of the small river, and consists of narrow streets of shops and dwelling-houses, occupied by the descendants of the Portuguese, and by Chinamen. In the suburbs are the houses of the

English officials and of a few Portuguese merchants, embedded in groves of palms and fruit-trees, whose varied and beautiful foliage furnishes a pleasing relief to the eye, as well as most grateful shade.

The old fort, the large Government House, and the ruins of a cathedral, attest the former wealth and importance of this place, which was once as much the centre of Eastern trade as Singapore is now. The following description of it by Linschott, who wrote two hundred and seventy years ago, strikingly exhibits the change it has undergone:—

"Malacca is inhabited by the Portuguese and by natives of the country, called Malays. The Portuguese have here a fortress, as at Mozambique, and there is no fortress in all the Indies, after those of Mozambique and Ormuz, where the captains perform their duty better than in this one. This place is the market of all India, of China, of the Moluccas, and of other islands round about, from all which places, as well as from Banda, Java, Sumatra, Siam, Pegu, Bengal, Coromandel, and India, arrive ships, which come and go incessantly, charged with an infinity of merchandises. There would be in this place a much greater number of Portuguese if it were not for the inconvenience and unhealthiness of the air, which is hurtful not only to strangers, but also to natives of the country. Thence it is that all who live in the country pay tribute of their health, suffering from a certain disease, which makes them lose either their skin or their hair. And those who escape consider it a miracle, which occasions many to leave the country, while the ardent desire of gain induces others to risk their health, and endeavour to endure such an atmosphere. The origin of this town, as the natives say, was very small, only having at the beginning, by reason of the unhealthiness of the air, but six or seven fishermen who inhabited it. But the number was increased by the meeting of fishermen from Siam, Pegu, and Bengal, who came and built a city, and established a peculiar language, drawn from the most elegant modes of speaking of other nations, so that in fact the language of the Malays is at present the most refined, exact, and celebrated of all the East. The name of Malacca was given to this town, which, by the convenience of its situation, in a short time grew to such wealth, that it does not yield to the most powerful towns and regions round about. The natives, both men and women, are very courteous, and are reckoned the most skilful in the world in compliments, and study much to compose and repeat verses and love-songs. Their language is in vogue through the Indies, as the French is here."

At present, a vessel over a hundred tons hardly ever enters its port, and the trade is entirely confined to a few petty products of the forests, and to the fruit, which the trees planted by the old Portuguese now produce for the enjoyment of the inhabitants of Singapore. Although rather subject to fevers, it is not at present considered very unhealthy.

The population of Malacca consists of several races. The ubiquitous Chinese are perhaps the most numerous, keeping up their manners, customs, and language; the indigenous Malays are next in point of numbers, and their language is the Lingua-franca of the place. Next come the descendants of the Portuguese—a mixed, degraded, and degenerate race, but who still keep up the use of their mother tongue, though ruefully mutilated in grammar; and then there are the English rulers, and the descendants of the Dutch, who all speak English. The Portuguese spoken at Malacca is a useful philological phenomenon. The verbs have mostly lost their inflections, and one form does for all moods, tenses, numbers, and persons. *Eu vai*, serves for "I go," "I went," or, "I will go." Adjectives, too, have been deprived of their feminine and plural terminations, so that the language is reduced to a marvellous simplicity, and, with the admixture of a few Malay words, becomes rather puzzling to one who has heard only the pure Lusitanian.

In costume these several peoples are as varied as in their speech. The English preserve the tight-fitting coat, waistcoat, and trousers, and the abominable hat and cravat; the Portuguese patronize a light jacket, or, more frequently, shirt and trousers only; the Malays wear their national jacket and sarong (a kind of kilt), with loose drawers; while the Chinese never depart in the least from their national dress, which, indeed, it is impossible to improve for a tropical climate, whether as regards comfort or appearance. The loosely-hanging trousers, and neat white half-shirt half-jacket, are exactly what a dress should be in this low latitude.

I engaged two Portuguese to accompany me into the interior; one as a cook, the other to shoot and skin birds, which is quite a trade in Malacca. I first stayed a fortnight at a village called Gading, where I was accommodated in the house of some Chinese converts, to whom I was recommended by the Jesuit missionaries. The house was a mere shed, but it was kept clean, and I made myself sufficiently comfortable. My hosts were forming a pepper and gambir plantation, and in the immediate neighbourhood were extensive tin-washings, employing over a thousand Chinese. The tin is obtained in the form of black grains from beds of quartzose sand, and is melted into ingots in rude clay furnaces. The soil seemed poor, and the forest was very dense with undergrowth, and not at all productive of insects; but, on the other hand, birds were abundant, and I was at once introduced to the rich ornithological treasures of the Malayan region.

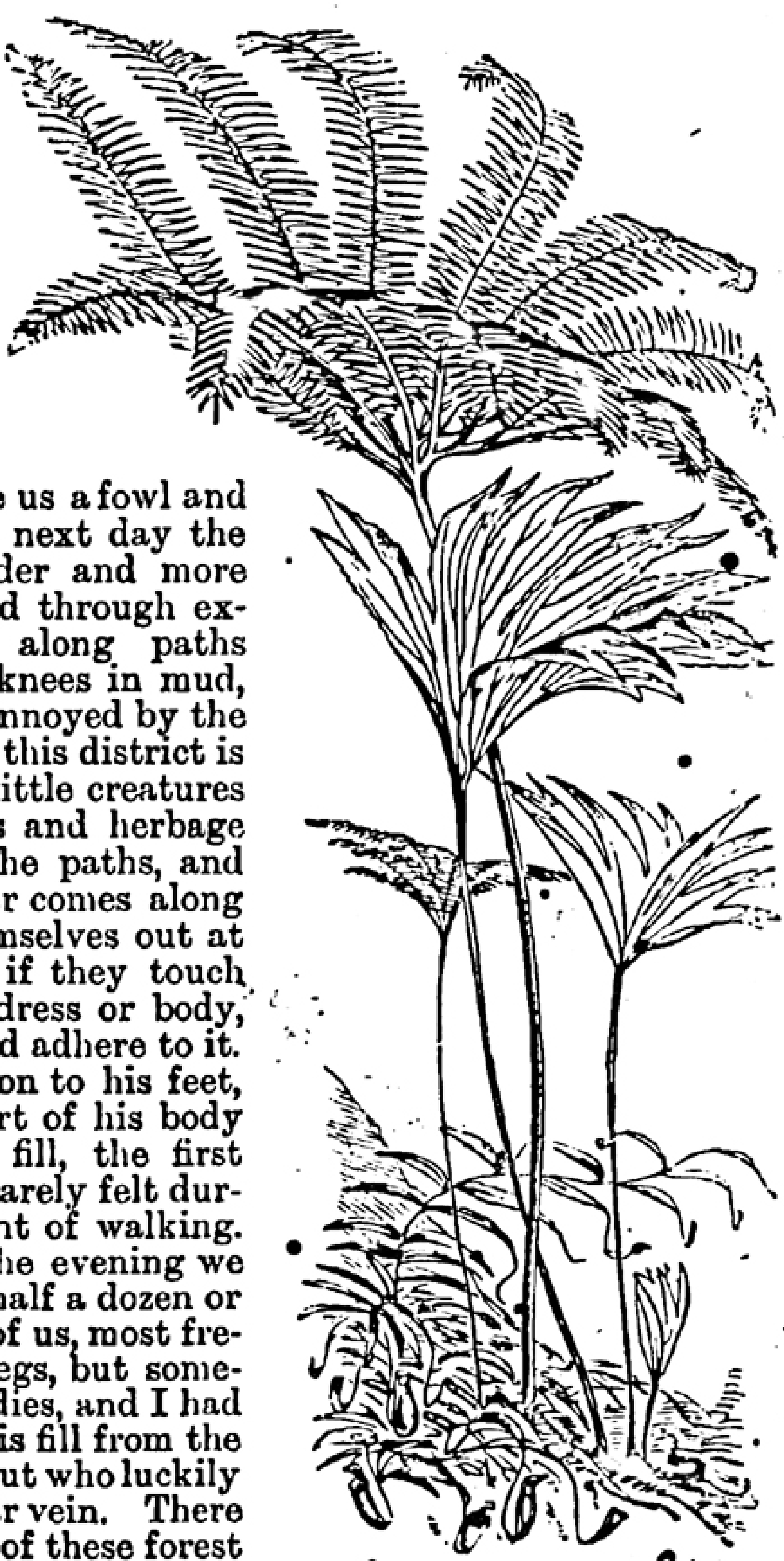
The very first time I fired my gun I brought down one of the most curious and beautiful of the Malacca birds, the blue-billed gaper (Cymbirhynchus macrorhynchus), called by the Malays the "Rain-bird." It is about the size of a starling, black and rich claret colour with white shoulder stripes, and a very large and broad bill of the most pure cobalt blue above and orange

below, while the iris is emerald green. As the skins dry the bill turns dull black, but even then the bird is handsome. When fresh killed, the contrast of the vivid blue with the rich colours of the plumage is remarkably striking and beautiful. The lovely Eastern trogons, with their rich brown backs, beautifully pencilled wings, and crimson breasts, were also soon obtained, as well as the large green barbets (Megalæma versicolor)—fruit-eating birds, something like small toucans, with a short, straight bristly bill, and whose head and neck are variegated with patches of the most vivid blue and crimson. A day or two after, my hunter brought me a specimen of the green gaper (Calyptomena viridis), which is like a small cock-of-the-rock, but entirely of the most vivid green, delicately marked on the wings with black bars. Handsome woodpeckers and gay king-fishers, green and brown cuckoos with velvety red faces and green beaks, red-breasted doves and metallic honeysuckers, were brought in day after day, and kept me in a continual state of pleasurable excitement. After a fortnight one of my servants was seized with fever, and on returning to Malacca, the same disease attacked the other as well as myself. By a liberal use of quinine, I soon recovered, and obtaining other men, went to stay at the Government bungalow of Ayer-panas, accompanied by a young gentleman, a native of the place, who had a taste for natural history.

At Ayer-panas we had a comfortable house to stay in, and plenty of room to dry and preserve our specimens; but, owing to there being no industrious Chinese to cut down timber, insects were comparatively scarce, with the exception of butter-flies, of which I formed a very fine collection. The manner in which I obtained one fine insect was curious, and indicates how fragmentary and imperfect a traveller's collection must necessarily be. I was one afternoon walking along a favourite road through the forest, with my gun, when I saw a butterfly on the ground. It was large, handsome, and quite new to me, and I got close to it before it flew away. I then observed that it had been settling on the dung of some carnivorous animal. Thinking it might return to the same spot, I next day after breakfast took my net, and as I approached the place was delighted to see the same butterfly sitting on the same piece of dung, and succeeded in capturing it. It was an entirely new species of great beauty, and has been named by Mr. Hewitson Nymphalis calydonia. I never saw another specimen of it, and it was only after twelve years had elapsed that a second individual reached this country from the north-western part of Borneo.

Having determined to visit Mount Ophir, which is situated in the middle of the peninsula about fifty miles east of Malacca, we engaged six Malays to accompany us and carry our baggage. As we meant to stay at least a week at the mountain, we took with us a good supply of rice, a little biscuit, butter, and coffee, some dried fish and a little brandy, with blankets, a change of

clothes, insect and bird boxes, nets, guns, and ammunition. The distance from Ayer-panas was supposed to be about thirty miles. Our first day's march lay through patches of forest clearings and Malay villages, and was pleasant enough. At night we slept at the house of a Malay chief, who lent us a verandah, and gave us a fowl and some eggs. The next day the country got wilder and more hilly. We passed through extensive forests, along paths often up to our knees in mud, and were much annoyed by the leeches for which this district is famous. These little creatures infest the leaves and herbage by the side of the paths, and when a passenger comes along they stretch themselves out at full length, and if they touch any part of his dress or body, quit their leaf and adhere to it. They then creep on to his feet, legs, or other part of his body and suck their fill, the first puncture being rarely felt during the excitement of walking. On bathing in the evening we generally found half a dozen or a dozen on each of us, most frequently on our legs, but sometimes on our bodies, and I had one who sucked his fill from the side of my neck, but who luckily missed the jugular vein. There are many species of these forest leeches. All are small, but some are beautifully marked with stripes of bright yellow. They probably attach themselves to deer or other animals which frequent the forest paths, and



RARE FERNS ON MOUNT OPHIR.

have thus acquired the singular habit of stretching themselves out at the sound of a footstep or of rustling foliage. Early in the afternoon we reached the foot of the mountain, and encamped by the side of a fine stream, whose rocky banks were overgrown with ferns. Our oldest Malay had been accustomed to shoot birds in this neighbourhood for the Malacca dealers, and had been to the top of the mountain, and while we amused ourselves shooting and insect hunting, he went with two others to clear the path for our ascent the next day.

Early next morning we started after breakfast, carrying blankets and provisions, as we intended to sleep upon the mountain. After passing a little tangled jungle and swampy thickets through which our men had cleared a path, we emerged into a fine lofty forest pretty clear of undergrowth, and in which we could walk freely. We ascended steadily up a moderate slope for several miles, having a deep ravine on our left. We then had a level plateau or shoulder to cross, after which the ascent was steeper and the forest denser till we came out upon the "Padang-batu," or stone field, a place of which we had heard much, but could never get any one to describe intelligibly. We found it to be a steep slope of even rock, extending along the mountain side farther than we could see. Parts of it were quite bare, but where it was cracked and fissured there grew a most luxuriant vegetation, among which the pitcher plants were the most remarkable. These wonderful plants never seem to succeed well in our hot-houses, and are there seen to little advantage. Here they grew up into half-climbing shrubs, their curious pitchers of various sizes and forms hanging abundantly from their leaves, and continually exciting our admiration by their size and beauty. A few coniferæ of the genus Dacrydium here first appeared, and in the thickets just above the rocky surface we walked through groves of those splendid ferns Dipteris Horsfieldii and Matonia pectinata, which bear large spreading palmate fronds on slender stems six or eight feet high. The Matonia is the tallest and most elegant, and is known only from this mountain, and neither of them is yet introduced into our hot-houses.

It was very striking to come out from the dark, cool, and shady forest in which we had been ascending since we started, on to this hot, open rocky slope where we seemed to have entered at one step from a lowland to an alpine vegetation. The height, as measured by a sympiesometer, was about 2,800 feet. We had been told we should find water at Padang-batu, but we looked about for it in vain, as we were exceedingly thirsty. At last we turned to the pitcher-plants, but the water contained in the pitchers (about half a pint in each) was full of insects and otherwise uninviting. On tasting it, however, we found it very palatable, though rather warm, and we all quenched our thirst from these natural jugs. Farther on we came to forest again, but of a more dwarfed and

stunted character than below; and alternately passing along ridges and descending into valleys, we reached a peak separated from the true summit of the mountain by a considerable chasm. Here our porters gave in, and declared they could carry their loads no further; and certainly the ascent to the highest peak was very precipitous. But on the spot where we were there was no water, whereas it was well known that there was a spring close to the summit, so we determined to go on without them, and carry with us only what was absolutely necessary. We accordingly took a blanket each, and divided our food and other articles among us, and went on with only the old Malay and his son.

After descending into the saddle between the two peaks we found the ascent very laborious, the slope being so steep as often to necessitate hand-climbing. Besides a bushy vegetation the ground was covered knee-deep with mosses on a foundation of decaying leaves and rugged rock, and it was a hard hour's climb to the small ledge just below the summit, where an overhanging rock forms a convenient shelter, and a little basin collects the trickling water. Here we put down our loads, and in a few minutes more stood on the summit of Mount Ophir, 4,000 feet above the sea. The top is a small rocky platform covered with rhododendrons and other shrubs. The afternoon was clear, and the view fine in its way—ranges of hill and valley everywhere covered with interminable forest, with glistening rivers winding among them. In a distant view a forest country is very monotonous, and no mountain I have ever ascended in the tropics presents a panorama equal to that from Snowdon, while the views in Switzerland are immeasurably superior. When boiling our coffee I took observations with a good boiling-point thermometer, as well as with the sympiesometer, and we then enjoyed our evening meal and the noble prospect that lay before us. The night was calm and very mild, and having made a bed of twigs and branches over which we laid our blankets, we passed a very comfortable night. Our porters had followed us after a rest, bringing only their rice to cook, and luckily we did not require the baggage they left behind them. In the morning I caught a few butterflies and beetles, and my friend got a few land-shells; and we then descended, bringing with us some specimens of the ferns and pitcher-plants of Padang-batu.

The place where we had first encamped at the foot of the mountain being very gloomy, we chose another in a kind of swamp near a stream overgrown with Zingiberaceous plants, in which a clearing was easily made. Here our men built two little huts without sides, that would just shelter us from the rain; and we lived in them for a week, shooting and insect-hunting, and roaming about the forests at the foot of the mountain. This was the country of the great Argus pheasant, and we continually heard its cry. On asking the old Malay to

try and shoot one for me, he told me that although he had been for twenty years shooting birds in these forests he had never yet shot one, and had never even seen one except after it had been caught. The bird is so exceedingly shy and wary, and runs along the ground in the densest parts of the forest so quickly, that it is impossible to get near it; and its sober colours and rich eye-like spots, which are so ornamental when seen in a museum, must harmonize well with the dead leaves among which it dwells, and render it very inconspicuous. All the specimens sold in Malacca are caught in snares, and my informant, though he had shot none, had snared plenty.

The tiger and rhinoceros are still found here, and a few years ago elephants abounded, but they have lately all disappeared. We found some heaps of dung, which seemed to be that of elephants, and some tracks of the rhinoceros, but saw none of the animals. We, however, kept a fire up all night in case any of these creatures should visit us, and two of our men declared that they did one day see a rhinoceros. When our rice was finished, and our boxes full of specimens, we returned to Ayer-panas, and a few days afterwards went on to Malacca, and thence to Singapore. Mount Ophir has quite a reputation for fever, and all our friends were astonished at our recklessness in staying so long at its foot; but we none of us suffered in the least, and I shall ever look back with pleasure to my trip, as being my first introduction to mountain scenery in the Eastern tropics.

The meagreness and brevity of the sketch I have here given of my visit to Singapore and the Malay Peninsula is due to my having trusted chiefly to some private letters and a note-book which were lost; and to a paper on Malacca and Mount Ophir which was sent to the Royal Geographical Society, but which was neither read nor printed, owing to press of matter at the end of a session, and the MSS. of which cannot now be found. I the less regret this, however, as so many works have been written on these parts; and I always intended to pass lightly over my travels in the western and better known portions of the Archipelago, in order to devote more space to the remoter districts, about which hardly anything has been written in the English language.

CHAPTER IV.

BORNEO—THE ORANG-UTAN.

I ARRIVED at Saráwak on November 1st, 1854, and left it on January 25th, 1856. In the interval I resided at many different localities, and saw a good deal of the Dyak tribes as well as of the Bornean Malays. I was hospitably entertained by Sir

James Brooke, and lived in his house whenever I was at the town of Saráwak in the intervals of my journeys. But so many books have been written about this part of Borneo since I was there, that I shall avoid going into details of what I saw and heard and thought of Saráwak and its ruler, confining myself chiefly to my experiences as a naturalist in search of shells, insects, birds, and the Orang-utan, and to an account of a journey through a part of the interior seldom visited by Europeans.

The first four months of my visit were spent in various parts of the Saráwak River, from Santubong at its mouth up to the picturesque limestone mountains and Chinese gold-fields of Bow and Bedé. This part of the country has been so frequently described that I shall pass it over, especially as, owing to its being the height of the wet season, my collections were comparatively poor and insignificant.

In March, 1855, I determined to go to the coal-works which were being opened near the Simunjon River, a small branch of the Sádong, a river east of Saráwak and between it and the Batang-Lupar. The Simunjon enters the Sádong River about twenty miles up. It is very narrow and very winding, and much overshadowed by the lofty forest, which sometimes almost meets over it. The whole country between it and the sea is a perfectly level forest-covered swamp, out of which rise a few isolated hills, at the foot of one of which the works are situated. From the landing-place to the hill a Dyak road had been formed, which consisted solely of tree-trunks, laid end to end. Along these the bare-footed natives walk and carry heavy burdens with the greatest ease, but to a booted European it is very slippery work, and when one's attention is constantly attracted by the various objects of interest around, a few tumbles into the bog are almost inevitable. During my first walk along this road I saw few insects or birds, but noticed some very handsome orchids in flower, of the genus Cœlogyne, a group which I afterwards found to be very abundant, and characteristic of the district. On the slope of the hill near its foot a patch of forest had been cleared away, and several rude houses erected, in which were residing Mr. Coulson, the engineer, and a number of Chinese workmen. I was at first kindly accommodated in Mr. Coulson's house, but finding the spot very suitable for me, and offering great facilities for collecting, I had a small house of two rooms and a verandah built for myself. Here I remained nearly nine months, and made an immense collection of insects, to which class of animals I devoted my chief attention, owing to the circumstances being especially favourable.

In the tropics a large proportion of the insects of all orders, and especially of the large and favourite group of beetles, are more or less dependent on vegetation, and particularly on timber, bark, and leaves in various stages of decay. In the untouched virgin forest, the insects which frequent such situations

are scattered over an immense extent of country, at spots where trees have fallen through decay and old age, or have succumbed to the fury of the tempest; and twenty square miles of country may not contain so many fallen and decayed trees as are to be found in any small clearing. The quantity and the variety of beetles and of many other insects that can be collected at a given time in any tropical locality, will depend, first upon the immediate vicinity of a great extent of virgin forest, and secondly upon the quantity of trees that for some months past have been, and which are still being cut down, and left to dry and decay upon the ground. Now, during my whole twelve years' collecting in the western and eastern tropics, I never enjoyed such advantages in this respect as at the Simunjon coal-works. For several months from twenty to fifty Chinamen and Dyaks were employed almost exclusively in clearing a large space in the forest, and in making a wide opening for a railroad to the Sádong River, two miles distant. Besides this, sawpits were established at various points in the jungle, and large trees were felled to be cut up into beams and planks. For hundreds of miles in every direction a magnificent forest extended over plain and mountain, rock and morass, and I arrived at the spot just as the rains began to diminish and the daily sunshine to increase; a time which I have always found the most favourable season for collecting. The number of openings and sunny places and of pathways, were also an attraction to wasps and butterflies; and by paying a cent each for all insects that were brought me, I obtained from the Dyaks and the Chinamen many fine locusts and Phasmidæ, as well as numbers of handsome beetles.

When I arrived at the mines, on the 14th of March, I had collected in the four preceding months, 320 different kinds of beetles. In less than a fortnight I had doubled this number, an average of about twenty-four new species every day. On one day I collected seventy-six different kinds, of which thirty-four were new to me. By the end of April I had more than a thousand species, and they then went on increasing at a slower rate; so that I obtained altogether in Borneo about two thousand distinct kinds, of which all but about a hundred were collected at this place, and on scarcely more than a square mile of ground. The most numerous and most interesting groups of beetles were the Longicorns and Rhynchophora, both pre-eminently wood-feeders. The former, characterized by their graceful forms and long antennæ, were especially numerous, amounting to nearly three hundred species, nine-tenths of which were entirely new, and many of them remarkable for their large size, strange forms, and beautiful colouring. The latter correspond to our weevils and allied groups, and in the tropics are exceedingly numerous and varied, often swarming upon dead timber, so that I sometimes obtained fifty or sixty different kinds in a day. My Bornean collections of this group exceeded five hundred species.

My collection of butterflies was not large; but I obtained

some rare and very handsome insects, the most remarkable being the Ornithoptera Brookeana, one of the most elegant species known. This beautiful creature has very long and pointed wings, almost resembling a sphinx moth in shape. It is deep velvety black, with a curved band of spots of a brilliant metallic-green colour extending across the wings from tip to tip, each spot being shaped exactly like a small triangular feather, and having very much the effect of a row of the wing coverts of the Mexican trogon laid upon black velvet. The only other marks are a broad neck-collar of vivid crimson, and a few delicate white touches on the outer margins of the hind wings. This species, which was then quite new and which I named after Sir James Brooke, was very rare. It was seen occasionally flying swiftly in the clearings, and now and then settling for an instant at puddles and muddy places, so that I only succeeded in capturing two or three specimens. In some other parts of the country I was assured it was abundant, and a good many specimens have been sent to England; but as yet all have been males, and we are quite unable to conjecture what the female may be like, owing to the extreme isolation of the species, and its want of close affinity to any other known insect.[1]

One of the most curious and interesting reptiles which I met with in Borneo was a large tree-frog, which was brought me by one of the Chinese workmen. He assured me that he had seen it come down, in a slanting direction, from a high tree, as if it flew. On examining it, I found the toes very long and fully webbed to their very extremity, so that when expanded they offered a surface much larger than that of the body. The fore legs were also bordered by a membrane, and the body was capable of considerable inflation. The back and limbs were of a very deep shining green colour, the under surface and the inner toes yellow, while the webs were black, rayed with yellow. The body was about four inches long, while the webs of each hind foot, when fully expanded, covering a surface of four square inches, and the webs of all the feet together about twelve square inches. As the extremities of the toes have dilated discs for adhesion, showing the creature to be a true tree-frog, it is difficult to imagine that this immense membrane of the toes can be for the purpose of swimming only, and the account of the Chinaman, that it flew down from the tree, becomes more credible. This is, I believe, the first instance known of a "flying frog," and it is very interesting to Darwinians as showing, that the variability of the toes which have been already modified for purposes of swimming and adhesive climbing, have been taken advantage of to enable an allied species to pass through the air like the flying lizard. It would appear to be a new species of the genus

1 Females have since been captured in some plenty. They resemble the male, but have more white and less brilliant colours.

Rhacophorus, which consists of several frogs of a much smaller size than this, and having the webs of the toes less developed.

During my stay in Borneo I had no hunter to shoot for me regularly, and, being myself fully occupied with insects, I did not succeed in obtaining a very good collection of the birds or Mammalia, many of which, however, are well known, being identical with species found in Malacca. Among the Mammalia were five squirrels, two tiger-cats, the Gymnurus Rafflesii, which

FLYING FROG.

looks like a cross between a pig and a polecat, and the Cynogale Bennetti—a rare, otter-like animal, with very broad muzzle clothed with long bristles.

One of my chief objects in coming to stay at Simunjon was to see the Orang-utan (or great man-like ape of Borneo) in his native haunts, to study his habits, and obtain good specimens of the different varieties and species of both sexes, and of the adult and young animals. In all these objects I succeeded beyond my expectations, and will now give some account of my experience in